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The Camel's foot climber, *Phanera vahlii* (Wight & Arn.)

Benth. (Fabaceae: Cercidoideae): traditional economic uses and livelihood provider for tribals

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ABSTRACT

Phanera vahlii is a perennial woody climber. Different parts of this plant such as stem, bark, leaves and seeds are used in various ways. The plant is a livelihood provider for tribal people in areas where this climber grows naturally. But, the over-exploitation of this plant is leading to the reduction of its population size. The harvesting practices for the collection of these plant parts need to be modified and refined to allow the plant to carry out its annual phenological events unabated. This plant appears to be ideal for cultivation in podu lands and on the hill slopes which are prone or open to soil erosion; its cultivation in effect controls soil erosion and promote soil accumulation and soil fertility.

Keywords: *Phanera vahlii*, economic uses, livelihood, tribal people.

1. INTRODUCTION

Tewari (1989) documented that Non-Wood Forest Products have an important role as livelihood opportunities for tribal households in Andhra Pradesh and also in other areas of its distribution in India. This author also noted that the forests from where they collect these products are important in their cultural and socio-economic activities. Further, this author and also Burman (1990) reported that tribal households depend on these products as important sources of income in Andhra Pradesh. Singh et al. (2014) reported that *Bauhinia vahlii* which is now known as *Phanera vahlii* is a common climber and included as a non-timber forest product throughout its distribution range in India.

The genus *Phanera* (Family Fabaceae, subfamily Caesalpinoideae) is derived from the Greek word “*phaneros*” meaning conspicuous which refers to the well-spreading calyx and corolla of the flower. It is assigned with species of vine or liana habit possessing tendrils and a lobed calyx and is characterized

by a huge evergreen climber with coiled revolute tendrils, single Camel's foot shape leaf formed by twin leaflets and producing white, yellow or purple flowers with 5 large petals and stamens. *P. vahlii* is one of the species which is very common and widely used for different purposes. The species is named after a Danish botanist, Martin Vahl. Shukla and Gahlot (2020) stated that *P. vahlii* is a giant climbing shrub which is distributed in the Sub-Himalayan region, Assam, Central India, Bihar, Eastern and Western Ghats. Thakur et al. (2022) reported that *P. vahlii* is a multipurpose species which is used for different economic and medicinal purposes by rural communities in India. With this backdrop, the present work on the economic uses of stem, bark, leaves and seeds of *Phanera vahlii* is reported based on the field study in Paderu division and its surrounding areas in the northern Eastern Ghats of Andhra Pradesh, India.

2. MATERIALS AND METHODS

Phanera vahlii (=*Bauhinia vahlii* Wight & Arn.) is woody climbing shrub and is naturally distributed in the northern Eastern Ghats of Andhra Pradesh. In Paderu division and its surrounding areas, different parts of this climbing shrub are used for economic and medicinal uses by local tribal people. Field visits and personal interviews were conducted to collect information from tribals about uses of *P. vahlii* during November 2021 to January 2022. The plant parts used were photographed and presented in Figures 1-3. The collected information was systematically presented to highlight the importance of *P. vahlii* as a source of livelihood for tribal people and its uses in our life.

3. OBSERVATIONS AND DISCUSSION

Phanera vahlii is an obligate woody climbing shrub with distinct outer and inner layers of bark (Figure 1a). The outer layer of bark is brownish or ash-grey, scaly and smooth or slightly fissured while the inner layer of bark is creamy white, fibrous and tastes bitter (Figure 2a). This shrub is self-supported by means of tendrils which are positioned opposite to the leaves (Figure 1b). In these tendrils, the inner tissue is very delicate and sensitive to touch due to which it is able to wind around the supporting branches of trees. Then, the tendrils get the grip and strangulate the host tree branches, which enable it to climb and spread to the top covering the crown of the tree due to which the host tree is affected in terms of growth and development. However, this climbing shrub is useful if it grows naturally or planted on rocky or bare slopes because it grows quickly and covers the ground with its large leaves preventing soil erosion. The leaves are 2-lobed and circular or ovate (Figure 2c,d). Fruit is a woody flat elliptic, ash-coloured velvety indehiscent pod (Figure 1c,d) producing 3 to 9 flat creamy white, polished seeds (Figure 3a,b).



Figure 1. *Phanera vahlii*: a. Habit, b. Leaves with coiled revolute tendril, c. Fruiting phase – pod growth and development, d. Mature pods.

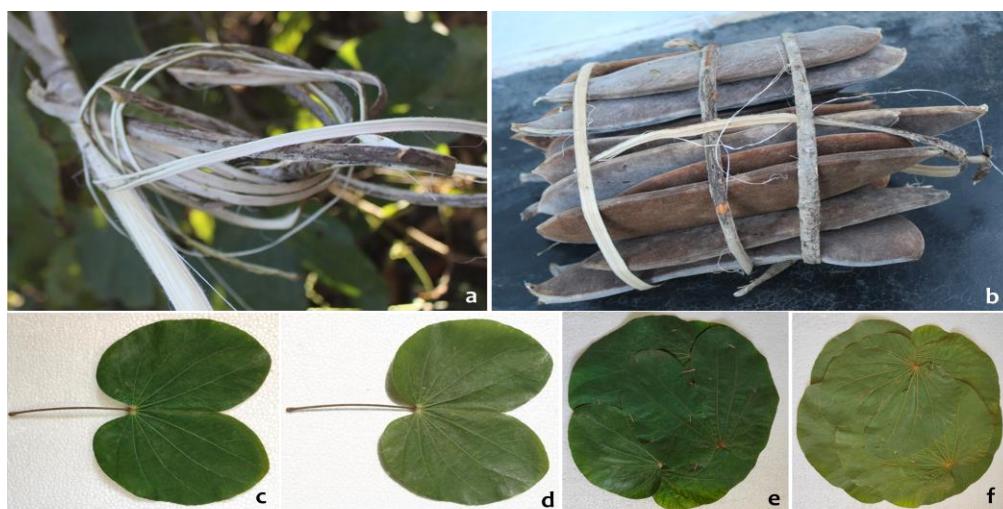


Figure 2. *Phanera vahlii*: a. Fiber extraction from bark, b. Fiber used for bundling the dry pods, c. Leaf upper surface, d. Leaf lower surface, e. Leaf plate upper surface, f. Leaf plate lower surface.



Figure 3. *Phanera vahlii*: a. pods producing 3-9 seeds, b. Seed arrangement, c. & d. Seeds sold in local vegetable markets.

In *P. vahlii*, the stems are separated and used for making baskets, mats and other wicker works. The collection of tender stems was carried out throughout the year but its collection is very prominent during transition period between wet and winter season. Long branches are cut from the main stem and one end of each branch is pounded with the blunt side of a handy chopper to release the outer bark from the inner bark and the separated outer bark is simply stripped off manually and discarded. Then, the inner bark is peeled off, dried in open sunlight and soaked in water for a few days in order to make it soft so that the fiber can be twisted easily for making ropes (Singh et al. 2014). The ropes made from this plant are used tying cattle, dry pods into bundles (Figure 2b) and withdraw water from the wells by using buckets (Gantait et al. 2008). The ropes are durable for a period of more than 1 year if they are not frequently soaked in water. The stem-made basketry and bark-made ropes are sold in local markets in the study area. The local people collect green leaves throughout the year; they harvest the maximum number of leaves from each plant causing damage to the plant. As a result, the standing stock of leaves becomes very much reduced which in turn affect the photosynthesis rate. The leaves collected are shade-dried and stitched into plates and cups manually (Figure 2e,f) or by machine using sticks of grass stems. From this forest region, 15-20 lakhs of leaves are procured every month by a Hindu temple management in Annavaram, Andhra Pradesh, for the distribution of "prasadam" meaning "sacred food" to devotees. The leaves of this plant are traditionally used as plates, cups and wrappers by vendors of sweets in this region. Chouhan and Saklani (2013) reported that leaf plates made of *P. vahlii* leaves are extensively used as meal plates traditionally in houses, hotels, weddings, community feasts, festivals and religious

ceremonies. Further, the use of *P. vahlii* leaves for packing cooked food and meat in small hotels and butcher shops is a common practice in villages. These authors also noted that *P. vahlii* leaves have antimicrobial, antioxidant, anti-diabetic and anti-inflammatory properties due to the presence of rich amount of quercetin flavonoides. Keeping these properties of *P. vahlii* leaves in view, Sahu and Padhy (2013) reported that the use of leaf plates of *P. vahlii* as meal plates or food packing material protects the food from food-borne or environmental pathogens. Somayaji and Hegde (2016) reported that *P. vahlii* leaves contain polyphenols and when leaf plates are used, these polyphenols could leach into the food and make them as ideal natural antioxidants. Rajaram and Janardhanan (1991) reported that *P. vahlii* contains a high content of crude protein, lipids, calcium and iron. Aruna Jyothi (2019) documented that the use of disposable plastic ware for serving food causes micro-plastic pollution and release toxic chemicals into the environment. In this context, she stated that the use of alternate renewable plant-based materials is an absolute solution as these materials are highly environmental-friendly, biodegradable, economical, amenable and easily disposable. The present study states that the use of *P. vahlii* leaves as meal plates, drinking cups and food packing materials is ideal in order to discourage plastic ware, cut down plastic pollution, recycle of leaf material back into the soil and provide livelihood opportunities for tribal people. However, indiscriminate harvesting of the stem, bark and leaves of *P. vahlii* leads to its population decline in the areas of its distribution. Thakur et al. (2022) stated that indiscriminate extraction of this plant has led to the decline of its populations in its distributional areas. These authors also noted that climate change has amplified the decline of natural populations of *P. vahlii* drastically. Therefore, the pertinent measures are required for the conservation and management of *P. vahlii* in its natural distributional range in India in order to protect this species from increased demand for its parts for different economic uses.

Singh et al. (2014) reported that *P. vahlii* seeds are edible after roasting and they are used as a substitute for almond. Further, the seeds have medicinal value and useful to cure infertility in women. In the study area, the seeds of *P. vahlii* are traditionally eaten raw and fried or cooked as a vegetable. They are sold in local open-air vegetable markets by tribal women (Figure 3c,d). The de-seeded pods could be used as a source of traditional firewood and fertilizer for application to agricultural fields. These various uses indicate that *P. vahlii* seeds have economical and medicinal value, and hence provide livelihood source for the households. Therefore, there is an urgent need to save natural populations of *P. vahlii* throughout its distribution range in India, and restore and expand its population size in each region for its continued use for various edible, medicinal and economical purposes.

4. CONCLUSION

Phanera vahlii is a perennial woody climber with partially deciduous nature during summer season. Its stem, bark, leaves and seeds have multiple uses and provide livelihood opportunities almost throughout the year for tribal people in areas where this climber grows naturally. The harvesting practices for the collection of these plant parts need to be modified and refined to allow the plant to grow continually and carry out its annual phenological events unabated. This plant appears to be ideal for cultivation in podu lands and on the hill slopes which are prone or open to soil erosion; its cultivation in effect controls soil erosion and promote soil accumulation and soil fertility.

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Ethical approval

Phanera vahlii species was used in the study. The ethical guidelines are followed in the study for plants & plant materials collection & identification.

Authors contributions

Both authors contributed equally.

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Conflicts of interests

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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